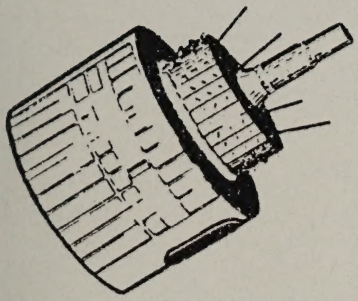
NEWSLETTER No.8



REMOTE IMAGING GROUP

March 1987

REMOTE IMAGING GROUP (R. I. G.)

NEWSLETTER No. 8 MAR 1987

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Welcome to RIG 1987. Well done to all those members who spotted the 'deliberate' error in the subscription form in the back of the last issue which said 'If you have recently paid your 1986 sub then please disregard this notice'.! In case some members failed to renew we have sent this issue to all 1986 paid-up members. If you had not paid at the time the mailing list was produced then it will say so on the label. All queries to Des, our membership sec. on this point.

The RIG one metre dish introduced in the last issue is proving extremely popular and will be going into another production run very soon. News of it has reached the RSGB Microwave Newsletter but it does not say that they have been produced for the benefit of RIG members only. Early trials with satellite TV using a Low Noise Block (LNB) of better than 2.0db noise figure have produced some very acceptable pictures so they now can be recommended for such applications.

New products:
Two of our members in Devon, Dave and Nigel, who produce the RIG receiver and preamp and who now trade under the name of DARICOM have been very busy in the winter months and have now produced three new items:

1 A plug-in module for the YU3UMV frame store which allows the correct setting of the grey levels by remote adjustment of reference voltages to the A to D chip. This provides the user with a much improved level of control for different pictures and hence much better use of the available grey levels in the frame store.

2 Horn feed and tripod assembly for the RIG dish for use with Meteosat 2.

3 A GasFet based down converter for receiving Meteosat 2 in conjunction with a 137MHz receiver.

Full details on specification and how to order them are elsewhere in this issue.

The following is a list of the events the RIG plan to attend in 1987:

RSGB National Convention at the NEC Birmingham	March	27/28
VHF Convention at Sandown Park	April	26
BATC rally at Crick (J25 on M1) near Rugby	May	3
Elvaston Castle Rally near Derby	June	14
AMSAT Colloquium at the University of Surrey	July	18/19
RSGB Mobile Rally at Woburn Abbey	August	2

As you can see it a pretty full calendar, one a month right through the season.

... contd on Page 39

CHAIRMANS REPORT.

At the time of writing (the end of January 1987) R.I.G. has been going for nearly two years! I hope we have all initiated something of which we are all proud to be members, I hope that we have given you something to think about in the Newsletters, as well as having provided you with the more simple things like orbit predictions etc. Some of the circuit ideas might have wet your appetite. Perhaps we have written or said something with which you disagree, on controversial subjects, but hopefully we can stimulate you,and make you look again in a different light. This is excatly what the group is about; to make us all think again and re-analyse what has been and is being done. We may not always make great leaps forward; sometimes we make sidesteps but as long as they are not backward steps we are making progress.

As you know the AGM is coming up again at the V.H.F. convention, at Sandown Park as usual, with the added complication of having to give a lecture in stream "B"(I believe) on weather satellites, hopefully assisted by other members of the committee. This will obviously take time as ever a resource which is unreplaceable. So to help the committee as much as possible, if you have any problems, please have a chat with us before the AGM., so that it might be sorted out before the meeting. I would like to take this opportunity of thanking all members of the committee for all their help in the past, especially the secretary and his long suffering wife, Judith.

The newsletter, from time to time, has presented us with problems you name it, we've had it. However it looks as if No.8 might originate at a different source, and hopefully improve things. As you know the newsletter is like our public image, and to help things along we are exploring the possibility of producing a video! No not a pop one, just a short tape (well an hour), to explain everything to the layman: the systems, the equipment, the results; in fact anything connected with weather satellites. It will probably be available through the R.S.G.B. services initially, but more news in the future.

Now for the more mundane things in life. I've had yet more trouble with my aerial! The signal level went down, and the bands of noise reappeared. Not to be bamboozled yet again, the aerial was immediately inspected and proved to be the source of the problem. This time one of the coax centre conductors had become disconnected from the brass dipole rod. While I had the complete thing down, I checked it thoroughly. The phasing harness had become leaky and water had got in the coax, so I renewed the complete harness, while I was able to. The main feeder appeared OK and continues in use.

The method of water proofing had broken down, so the faithful glue gun was warmed up, and liberally applied to the appropriate places, hopefully successfully this time. A good overhead pass now gives a signal level of 5 microvolts and noies free pictures, except when the satellite is near the horizon. I also checked the sensitivity of the R.I.G. receiver, and found it to be virtually noise free at 0.5 microvolts and upwards and contributes to receiving clean pictures.

I would be interested to hear your comments on the following incident. A few months ago I heard the signal from NOAA9 in the early morning while I was in bed with my wife (you do when you get to our age!) I cannot remember what had woken us both up, but I commented that "the satellite is in" to which my wife replied that she could not hear it. Well, while most women, picking up gossip from 50 feet, in a crowded room is not her speciallity, but she certainly isn't deaf, or even remotely so. This made me wounder whether over the years, my own hearing had become super-sensitized to 2400 hertz. The sound that I was hearing was not strong, but I am certain that it could have been attenuated by 6-10 dB. and I would still have heard it! The thought went through my mind that over the years my ears had been programmed to listen for 2400 hertz and could recognise it at very low levels. The path from our bedroom is approximately 40-50 feet and through one closed the door and one partially closed door. The receiver has only a small 1" speaker, and the amount of audio is turned down as not to disturb other sleeping members of the household. The power to the speaker has been measured at only 12 milliwatts. Has anyone else noticed this effect?

I dont know if anyone saw the item in Wireless World about a new kind or LCD with a very fast response time of up to 100 microsec, (normal LCD cells take something like 100 millisecs.) As this response time is faster than required for A.P.T. video modulation, further investigations were made. It might be possible to video modulate these cells, but they weren't certain. It was only in the development stage, and it's projected use was as shutter tubes, but keep an eye on it in the future. The cells are clear when on but only transmit 10% of the light. When off they only pass 1/30 of the on light, i.e. only 0.3%. This is on it's own it is not too bad as long as you have enough light in the first place.

I have obtained a Tektronics 4631 Hard Copy Unit which has all the ingredients of further development for high quality photographic A.P.T. use. The unit consists of a dry silver paper dispenser, a C.R.T. and a development stage. The dry silver paper passes over a special C.R.T. with fibre optic faceplate, A4 width and only 6mm. high.

The C.R.T. exposes the sensitive paper and after the frame is completed, guillotines it and passes it to the development section which is simply a set of heaters and thence to the outside world. The quality of prints I have seen is not high, but it does have possiblities. The C.R.T. can obviously be video modulated. It also has a separate E.H.T. supply and only a single scan system is required (horizontal) as the paper is drawn over the faceplate mechanically. It should be simple to modify. Problems that quickly spring to mind are the change in speed of the motor or gearing that draws the paper past the faceplate, of the fact that the length of frame appears fixed. If the heated development section was either disconnected or bypassed, perhaps this unit could be used with normal enlarging paper in a continuous roll. Ideas, comments, information - especially a circuit diagram would be very welcome. These units are usually of no use to anybody and are often scrapped as I have since obtained two further C.R.T.'s at nominal price just to save them from the big hammer.

From the same emporium has come 5 Mufax K460 B/4 Mobile Facsimile Recorders. Unfortunately only one has a helix in it, but the motors and gearing etc. are all there, however there are no electronics, as this was a separate unit. I shall obviously keep the complete one and maybe one of the others, but if anyone has the other parts or a particular need for the remaining units, then please contact me. They were very cheap but were in very good condition.

Another unit, obtained in the last few months, yet again from the same emporium is a Microdoc copier. It looks like an A4 copier but the copy is in the form of a 16mm. negative (sproketless). After 14 exposures it automactically guillotines the exposed film and processes it. I cannot see an immediate use for it, but if the processing side was scaled up and added to the Tektronics 4631 unit it might have even more possibilities.

Well that's about it for this quarter, I hope to see many of you at the usually rallies and exbitions in the coming months and I look forward to doing so, especially at Sandown.

Till then best wishes Henry.

MODIFICATION OF THE K401-B FAX RECEIVER FOR METEOSAT/NOAA

Based on the circuits by Guy Martin G8NFU.

Adrian Nash.

Part 1.

This series of articles describe some circuits that can be used to modify a K401-B facsimile machine for weather satellites. They may also be useful for modifying other machines. It is also hoped that it will give some thoughts the alternative use of fax printers for weather satellites instead of the almost universally used frame store. The design offered here are for modifying a K401-B so that it can either can be linked up to the "front-end" video circuits of a frame store or if desired, linked to an all purpose built weather fax demodulator. The plans are only ideas, and although they offer a basis for experimentation, I cannot give detailed plans since I have't even finished modifying my own machine yet, and also personal preference comes in to it when deciding on the desired specification of the modified machine.

FAX printers are never ideal for weather satellite reception. Even the meteorological office themselves use modified machines I understand. However, very good results are possible without the cost of a frame store and the complexity of a photo-fax system (not to mention the problems with developing the pics in some cases!)

The K401-B machines

The K401-B (as opposed to the K401-CH) is around; for example, there was an advertisement for these machines in the December 1985 issue of RIG. Newsletter. However, unlike its counterpart, it dose need some extensive modifications and a bit of metal drilling!

Guy Martin, G8NFU has produced some very good modification circuits, and it is with his kind permission that I am describing them here. The idea is to produce a FAX printer that accepts direct video form either a frame store or front end or a separate demodulator. Fig 1. indicates the required modifications. The two main mods are a motor speed control circuit and a proper video amplifier. Those of you lucky enough to lay your hands on a K401-CH don't need to bother with video circuits really. However, on most fax machines available as surplus, a motor speed change is necessary, done by either changing crystals, or building a DC/AC converter if the unit is mains sychronised.

Unmodified, the K401-B runs at a different helix speed to the satellites usual 240 Lines per min. (The helix is a spiral metal strip which is used to print the image line by line as it turns.) Some machines originally ran at 500 RPM.

These are the "Courier 500" machines. Others ran at 360 RPM (some -CH and -B machines), and others with the A/6, 1500 RPM motor ran at 180 RPM. All the machines whatever their speed can be modified for weather sats. All K401s are mains synchronous, that is the helix speed depends upon the AC mains frequency. The table below summarizes K401 helix motors.

Helix RPM.	Motor RPM.	Motor type/supply.		Required drive f.
500	4167	B045	240v	24Hz
360	3000	D/3	115v	33.33333Hz
180	1500	A/6	240v	66.666667Hz

It can seen from the table that all of the motors can be referenced to a 2400Hz stable reference using suitable dividers. To drive the helix motor at the correct speed, it is easiest to build a separate DC/AC converter that produces the AC motor supply with highly accurate and stable frequency, controlled by either a quartz crystal oscillator or an external sync tone (eg for tape recording).

The video amplifier on the K401-B (not the K401-CH though) is totally unsuitable for satellites since it contrast clamps between full black and white. However, a simple video circuit and very little modification to the electronics of the K401-B will reproduce reasonable satellite pictures.

The final addition to the K401-B is a power supply that supplies +24-30v for the motor drive unit, +/-12v for the other modifications.

The next issue of RIG newsletter gives circuit and details for the modifications. Go and track down a K401-B for yourself in time for the next issue.

PC BAZAAR

Selected for the Weather Satellite enthusiast:

DRAM Chips (Toshiba or Mitsubishi):

4164	64k Bit	150 ns	£1.20
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Minimum order 6 chips/10 disks. Prices inclusive.

Cheques made payable to : James Lucy, 17 Taylor's Road
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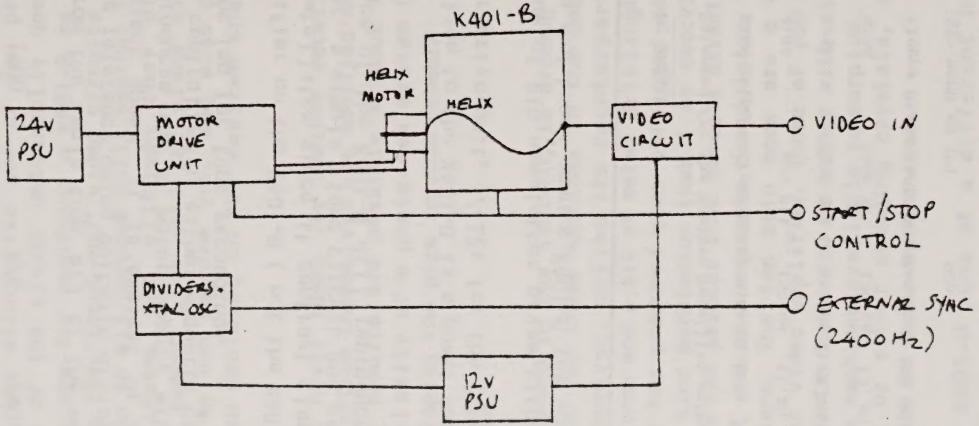


FIG 1 K401-B MODIFICATIONS

NODAL PERIOD DETERMINATION by Greg Roberts

Sometimes it is necessary to determine the Nodal period of revolution of an artificial Earth satellite. In most cases the NASA two line orbital element sets are available and these give the orbital period in revolutions per day. This period is in fact the anomalistic period and is the time from one perigee location to the next and the only way in which it varies if the semi-major axis changes which of course affects the orbital period and the precessional motion of the argument of perigee. It is relatively easy to derive the Nodal period, which is the time taken from one latitude crossing to the next, with the satellite heading in the same direction. This will also vary like the anomalistic period but is in effect less constant because it varies as a function of the argument of perigee. For our purposes we can neglect this, provided an update Nodal period determination is done from time to time.

A short BASIC program was written to do compute this and is given below. As the terminology employed by the TRS-80 micro-computer may be unknown to some users of the following explanations might help. When a REM appears in a statement line the computer ignores it, it is purely inserted for the convenience of the programmer so he knows what he has done. One could then effectively omit statement lines numbered 10 20 80 and 90. Dealing with line 30 one finds CLS-- this simply means clear the screen of all display and it positions the cursor at the top of the screen. Also in this line one finds DEFDBL A-Z. This means handle all quantities beginning with the letters A through to Z as double precision quantities. This allows 17 digits precision for the TRS-80. This is not really necessary if your computer cannot work to this accuracy. The rest of statement 30 is obvious --Z is the conversion factor for degrees to radians and C signifies 360 degrees in a circle.

The program has very little input, namely the satellite name, which is read as a string, the orbital inclination, eccentricity, and revolutions per-day--all the above from NASA data. In line 50 the semi-major axis is computed from the orbital period and in line 70 the precession values for the shift in Right Ascension of the Ascending Node and the shift in the perigee location are derived in degrees per day. Note that I occassionally use parameters of three or more letters, eg ANRP1. The TRS-80 only recognizes the first two as unique and if I have been careful the first two letters of any parameter are only defined once.

We finally end with two quanities, NP = Nodal period in minutes decimal minutes per orbit, and DL = the longitude increment per orbit. This increment depends on the rotation of the Earth during the Nodal period and the shift in Right Ascension per orbit. One might be puzzled by the [symbol appearing. My printer displays this for the the 'up arrow', which is used for exponentiation. (eg 2[3 = 8).

The program is pretty simple, so unless I've made a boo-boo you should have no trouble putting it in to your computer

```
 10 REM.....NODAL PREIOD AND LONGITUDE INCREMENT DETERINATION
 20 REM..... BY GREG ROBERTS DECEMBER 1985
 30 CLS:DEFDBL A-Z:Z=57.29578:C=360.0
 40PRINT'INPUT NASA ORBITAL DATA AS FOLLOWS  ':INPUT'SATELLITE
IDENTIFICATION':A$: INPUT'INCLINATION       ':IN:INPUT'ECCENTRICITY   ';
ECC:INPUT' REVS PER DAY          ';RD
 50 SMA=(7.53766D+13/RD[2)[(1/3):
 55  REM....SMA IS SEMI-MAJOR AXIS IN KILOMETRES
 60 PER=(SMA*(1-ECC[2))[2:A=(2.377328D+7/PER)*RD
 70 QNR1=A*COS(IN/Z)/C:ANRP1=A*(2-2.5*(SIN(IN/Z)[2))/C
 80 REM...QNR1 IS CHANGE IN RA IN DEGREES PER DAY
 90 REM...ANPR1 IS CHANGE IN ARG OF PERIGEE IN DEGREES PER DAY
 100 AP=1440.0/RD:1W=(ANRP1*C/RD)/360*AP:NP=AP-1W
 110 DL=NP*.250684477-(QNR1*C/RD)
 120 PRINT' NODAL PERIOD (MINS)          ';NP
 130 PRINT' LONG INCREMENT (DEGS)        ';DL
```

EXPLANATION AND FORMAT OF NASA TWO LINE ORBITAL DATA.

The orbital data required for most of the prediction methods now commonly available are those supplied by the National Aeronautics and Space Administration (NASA) as two line orbital data, also sometimes refered to as KEPLERIAN elements. The NASA elements are issued on a semi regular basis for all unclasified objects in orbit and are the elements encountered in amateur publications. For those not familiar with the format and in order to use the following explanation was provided by NASA.

ITEM	DESCRIPTION	UNITS	FIELD FORMAT
SATNO	Satellite number	None	xxxxx {*)
IDYR	International Designator (last two digits of launch year)	Launch year	xx
IDLND	International Designator (launch number of the year)	None	XXX
FDPNO	International Designator (piece? of launch)	None	XXX
EPYR	Epoch year (last two digits)	Epoch year	XX {**)
EPOCH	Epoch (day and fractional days of the year)	Days	XXX.XXXXXXXX
NDOT2	First Time Derivative of mean motion	revs per day squared	.XXXXXXXXX
II	Inclination	Degrees	XXX.XXXX

NODE	R.A. Ascending Node	Degrees	XXX.XXXX
EE	Eccentricity	None	.XXXXXXXX
OMEGA	Argument of Perigee	Degrees	XXX.XXXX
MM	Mean Anomaly	Degrees	XXX.XXXX
NN	Mean Motion	Revs per day	XX.XXXXXXXX
REVNO	Revolution number at epoch	Revs	XXXXX

{*} = sometimes omitted in publications.
{**} = sometimes omitted in publications-- assumed to be year in which data is transmitted.
Note----- NDOT2 can be preceeded by a positive or negative quantity.

These elements are derived from a short arc track by radar and the orbit derived is a best fit solution. It does not take into account past behaviour of the satellite and sometimes the new orbit is not accurate.

The largest single source of error is the drag term NDOT2. A question frequently asked is 'How often should I update my element file?'. If the satellite is found to be running within a few minutes then there is no real need to update. However if the error is large then there is obviously a need to update. The following table will give you a rough indication of the accuracy for various values of NDOT2:

	Interval {days} for accuracy of			
NDOT2	1 sec	10 sec	100 sec	1000 sec
1x10-2	0.6	1.8	5.8	18.2
1x10-3	1.8	5.8	18.2	58.2
1x10-4	5.8	18.2	58.2	182.0
1x10-5	18.2	58.2	182.0	580.0
1x10-6	58.2	182.0	580.0	1820.0
1x10-7	182.0	580.0	1820.0	5800.0

For OSCAR 10 it should therefore be apparent that a good set of elements should be good for at least a year, so update when you feel like it. However for accurate work more frequent updating may be necessary on account of possible errors in the orbit determinatiom. UOSAT 1, with a drag of about 2.6x10-5 and a tolerable error of say 2 minutes means updating every two months or so. Salyut 7, which is in a much lower orbit and thus has a higher drag of around 1.5x10-4 means updating more frequently-say around once a month. In the case of this satellite there is an additional complication in that the orbital altitude is frequently increased, so update as frequently as possible. As mentioned earlier one should be careful of the drag term so do not use this as the main criterion for updating. The best guide is predict, listen and note the error and then decide. I personally prefer to update with the latest elements available every time predictions are done.

CIRCULAR FEED HORN DATA by DERMOT G8SIN

These are the results of a program to design feedhorns for parabolic dishes with different F/D ratios. The results have been tested on a RIG dish F/D =.42 and on an Earth stations 0.9m dish, F/D =.5 the results should hold for other values. Probe length is 4.35cm.

F/D	Length(D)	Depth(D)	Probe Spacing (S)
.4	15.92	13.29	7.07 cm
.42	15.25	13.75	6.75 cm
.45	14.50	14.20	6.40 cm
.50	13.40	15.50	5.95 cm
.55	12.75	16.61	5.67 cm
.60	12.29	17.72	5.46 cm

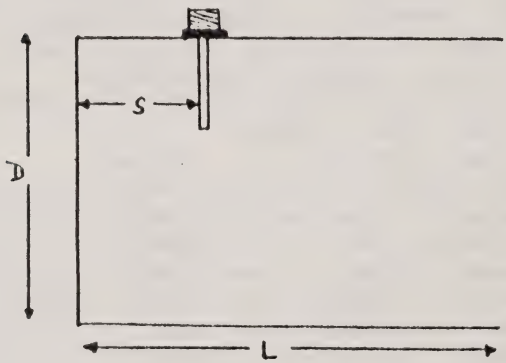


Figure 1

These dimensions are for a frequency in the middle of Ch's 1 and 2 on Meteosat.

Another thought for the newsletter from Dermot, a "seed" idea in the hope that someone may develop it:

It should be possible to modify the sync generation on the framestore to cause it to scan out as interlaced videos of two identical fields of 256 x 256. The 512 line frame this produced would give an image of better appearance it would also make better photography as less would be invisible. For those who are particularly interested in photo's from the framestore, here is an idea "lifted" from medical imaging.

First count the frame sync pulses in a 4 bit decode counter and convert to an analogue "stepped" sawtooth via a D to A converter. Now buffer this and scan it with the current in the frame scan coils in a monitor. Adjust the vertical "wobble" thus produced so that it is magnituide is equal to .9 of the spacing between line.

The end result is a picture with 2,560 lines, through a relatively long exposure time is a must, to avoid "banding" say 5 seconds. It may be possible to produce this with out modifying a monitor by working on the framestore sync itself as with the 512 mod suggested above. If so, then the exposure could be timed by gating video in units of 10 frames to avoid any bending artefacts. Hope this stimulates some further thoughts.

Dear Phil,

A short time ago I wrote you about the " Video Pre-Filter/AGC " that Ralph Taggart designed. I have received permission from him to send you a copy of the "73" article for publication in full or part in the RIG newsletter.
It's a great " front end " for the YU3UMV scan converter and replaces, without modification, the filters that never did work on the original board. I redesigned the circuit to include a DC-DC converter so as to supply both + and - 12 VDC from a single + 12V supply so that the op-amps work better. For interested parties a PC Board of the circuit is available from me for $10.00 plus $1.00 post. The board is about 2-1/2" square and is predrilled. As you can see, all parts are pretty much standard, but I can supply them on request.

Order part *969 from TIMEKIT, PO BOX 22277, Cleveland, Ohio 44122 USA.

WEATHER SATTELLITE VIDEO FORMATS & AN AGC SYSTEM FOR DISPLAY SYSTEMS SUCH AS THE YU3UMV FRAMESTORE by Ralph Taggart

This month (December '86) I am going to take a look at the basics of weather satellites video formats. One of the things that greatly simplifies the design of a weather satellite station is that all direct-broadcast satellites, be they polar orbiters or geostationary spacecraft, employ the same basic video modulation format. Although the rf modulation of these satellites is FM, the actual video signal transmitted in this fashion is an AM modulated audio tone. The audio tone or sub carrier is typical 2,400Hz or something very close to that value, a subject I will return to briefly at the end of this discussion. The modulation "sense" is such that minimum subcarrier amplitude corresponds to black, while maximum amplitude represents white.

Fig 1. shows a diagram representing the detected and filtered subcarrier during one line of transmission of a hypothetical 16 step grey scale. The grey scale begins with black on the left and ends with white on the right side of the display. The white level (100% amplitude) is arbitrarily set at +5V. Note that the black step is not 0 V (no sub-carrier). With most spacecraft, assuming the modulator is operating properly (see dicussion later), the black level will be about 4% of the peak white level or about 0.2 V with a +5V peak white value.

The dynamic range of this signal measure from 4% black to 100% white, is thus about 26 dB. This implies that the signal to noise ratio should be at least 26 dB, and perferably a little more, in order to have a "noise-free" video signal. As the amplitude of the noise increases relative to the video signal, the effect will first be noted as "snow" in the black end of the dynamic range. As noise levels increase, you will eventually reach a point where only the whitest portions of the image will peak above the noise threshold. There are two principal ways to increase the signal to noise ratio and lessen the impact of noise on your final display. The first involves optimizing the rf end of the system in several ways:

1] Maximizing antenna gain. Ignoring the negligible impact of solar and galactic noise, increasing the gain of the antenna provides "noise free" gain.

2] Use of a low noise front end.

3] Matching the i-f bandwidth to the signal bandwidth.

Assuming you have done every thing possible at the rf end, some judicious audio filtering can be applied to reduce impact of noise falling outside of the 2,400 Hz video passband. This is more complicated than simply putting a sharp 2,400 Hz bandpass filter in the video line because the AM modulated 2,400 Hz tone has side bands just like any AM signal and these must be passed in order to recover the video modulation with minimum distortion. Relatively low Q active filters, centered on 2,400Hz with a bandwidth of about 1,600Hz work well in practice.

Basic signal Conditioning

Your basic weather satellite video system involves a video detector and post-detection filter to recover the modulated waveform in a form similar to that illustrated in Fig 1. The filtered video output voltage is then used to control the display in one of three general ways:

1] Modulate the intensity of a CRT scanning beam in the case of a CRT {cathode ray tube monitor}.

2] Control of the voltage of a printing stylus or the intensity of a glow modulator tube for facsimile printing.

3] A/D {analog-to-digital } conversion of the detected waveform for scan converter display.

Regardless of how we are going to use the video, it is obvious that an AM system of this sort is going to be amplitude sensitive. Any display system will require some sort of gain or contrast control so that the peak subcarrier amplitudes will reproduce as white while the minimum {4%} amplitude will come out black. Anything that changes the peak white amplitude will result in a need to readjust such a control. Such readjustment can be tedious unless you use a scope to look at the video waveform, so we would like to minimize such peak amplitude variations as much as possible.

Unfortunately, there are lots of links in the system where such variation can occur. One of the more obvious sources, if you are recording pictures with tape, is variation in recording levels and audio output levels from your tape deck. This problem can be minimized by using a constant record and output level setting, preferably a combination that results in the same peak level that you would normally get directly from your receiver.

A second source of amplitude variation comes from the receiver in ways that are not inherently obvious. At this point, those of you who read my last column may be mumbling because I showed you how to install a constant output video tap from the top of the volume control.

If we assume a constant gain from the rf, if, and audio stages, such a tap will always produce the same peak audio levels at the output, given the same input signal.
Unfortunately, even though the gain characteristics of your receiver maybe quite stable, satellite signals are rarely "the same" pirmarily due to differences in the deviation of the spacecraft transmitters.

Assuming your discriminator is reasonably linear, if your receiver will generate a peak output level of a 1V (a purely arbitrary value) with a fully modulated TIROS/NOAA signal deviating =/- 18kHz, what do you think the results will be on a WEFAX geostationary signal that might be deviating +/- 10kHz? The answer is about 0.55 V-10/18 x 1! If your display system is ajusted to display peak white with the NOAA signal your WEFAX image "whites" will reach only mid range grey values unless you increase the gain or contrast in the display system.

While any given type of polar orbiting spacecraft will usually be fairly similar in terms of signal deviation characteristics (similar, but not absolutely equal), the peak signal levels recovered from the TIROS/NOAA satellites will be different from those recovered from a specific type of Soviet METEOR spacecraft, which in turn may differ from other experimental METEOR or COSMOS satellites. WEFAX deviation levels differ significantly, even from the same spacecraft, since the output signal on the WEFAX downlink simply mirrors the up-link signal, which is subject to both ground equipment and operator foibles.

Most of this unavoidable variation can be minimized in any display system by the addition of automatic gain control (agc) prior to video processing. Fig 2 shows a front end circuit to accomplish this with added bonus of pre filtering of the video signal.

IC1a is one section of a dual opamp wired as an active audio bandpass filter. The circuit has unity gain, a center frequency of 2,400Hz, and a bandwidth of approximately 1,600Hz. Placing this filter at the input of the circuit module provides two functions. The first is the obvious one of minimizing the effect on the display of noise outside of the video passband.

The second function is to minimize the effect of noise on the agc section that follows. The output of IC1a is routed through a two stage diode attenuator consisting of four 1N914 diodes (almost any diode will do as long as they are all of the same type). The attenuation level in this network is directly proportional to the dc control voltage applied to the two 10k resistors, a subject I will return to momentarily. The output from the diode attenuator network is applied to the input of IC1b, an opamp with a fixed voltage gain of about 120. The output of this amplifier drives a PNP transistor, which functions as the agc detector, producing a control voltage on the collector.

Relatively high drive from IC1b will produce a higher control voltage on the collector than a low drive condition will. This control voltage, when applied to diode attenuator network through the two 10k resistors, effectively controls the attenuation level of the network that provides the drive to IC1b. Should the input peak signal level increase, the output from IC1b will increase, causing a increase in the control voltage at the collector of T1, and this will cause an increase in the attenuation of the diode array, reducing the output from IC1b! Similarly, if the peak amplitude at the input decreases, the output from IC1b will fall, reducing the agc control voltage, which in turn reduces the diode attenuation, causing the output of IC1b to increase. In effect, the peak output from IC1b, which provides the drive for your display system, is in dynamic equilibrium, maintaining a very constant peak output level despite variations in peak input level. The input RC network to T1 controls the attack time of the agc system (essentially fast), while the components in the collector of T1 set the decay time constant (relatively slow). The values shown provide effective agc action without "pumping" in response to the video modulation waveform.

M1 is a 50 microamp panel meter that monitors the agc control voltages and provides visual indication that you are within the linear agc control range.

Construction:

Construction of the pre filter/agc module is quite straight forward and can be done by using veroboard. Common sense dictates a reasonably compact layout, particularly around the diode network and the agc amp. I dont know what the "outer limits" are in this regard, but I have duplicated the circuit many times without problems.

Only a few things are critical enough to triple check! The first of these is the polarity of the agc diodes. The second concerns the biasing of T1. Note that this is a PNP device and the emitter must go to +12 V. Put it in backwards or use an NPN unit and you will have problems. The final point concerns the tantalum capacitor in the base lead to T1. Note that drive is applied to the negative lead of the cap with the positive lead going to T1. You must observe this orientation or the circuit will not work.!

Setup:

Preset R1 (AGC THRESHOLD) and R14 (GAIN) so that the center arm of both pots is at ground (minimum gain). Connect the output of the receiver to J1 and set the receiver to a unused channel so that the unit is driven by noise. When you apply power, the agc meter (M1) should bounce up to full scale and then slowly decline to zero. If the unit pegs at 50 microamps, turn off power and check the installation of C8, T1, and D5.

Slowly advance R1 until the agc meter indicates a reading of 15. At this point the GAIN control should be adjusted to the desired output level. An audio amplifier, connected at J2, should yield an undisorted version of the original signal. The best way to check this is with a modulated satellite signal. With a modulated signal at the input, the agc meter should read about 15, retrim R1 if this is not the case.

Use:

In use, the module is simply placed between your video source (receiver, tape, etc) and your normal display system. All of your sources should produce an agc meter reading of between 10 and 20, indicating the linear portion of the agc range. Output gain can be set to any convenient value to drive your display. The most convenient level assuming you have already optimized your display contrast, is a peak level that corresponds to what you used to get directly from the receiver. Not only will this module provide desirable filtering, it will also virtually eliminate knob twiddling when switching from one spacecraft to another!

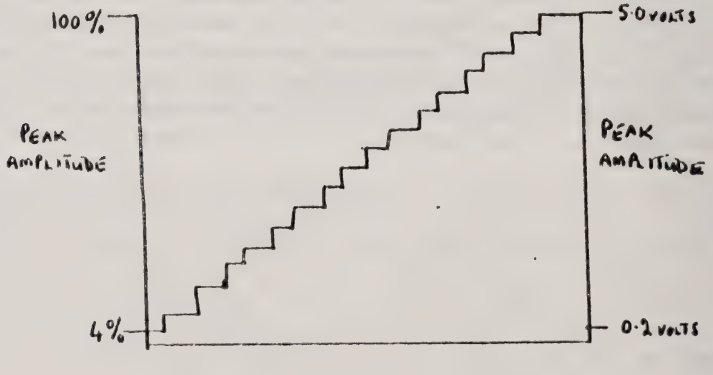


Fig 1.

IC1 mc1458 Dual Op Amp.
INPUT
10K
1µF TANT
10K
2K7
0.01µF MYLAR
0.01 µF MYLAR
20K
IC1a
-12v
+12v
1µF TANT
4K7
1N914
4K7
1N914
22µF TANTS.
22µF
10K
47K
50µA
M1
10K
4K7
.01µF MYLAR
1K
IC1b
100µF ELECT
2N4403 T1
47K
120K
+12 VOLTS
120K
10K
1µF TANT
OUTPUT

RUSSIAN SATELLITE SCENE by Les G8LOK

Meteor 2-15 87-01A 137.85 MHZ

One of the first launches of 1987 occured on January 5th in an 82.13 degrees inclination and 960 km high orbit, which was the signal for a possible new Meteor; by 11.25 GMT signals were received on 137.4 MHZ and quickly identified as a new Meteor Weather Sat. One of the first reports was from the Rev. James Brown who reported the unusal Meteor 2 format. On the 6th January at 11.12 GMT IR was heard prior to switching over to visible transmissions when good pictures were received.

At 14.03 IR signals were again heard prior to switching over to visible then at 14.40 GMT the signals were swamped by Met 3.1 and Cosmos 1760, all transmitting on the same frequency of 137.4 MHZ. Up to the time of writing good pictures were being received. By the end of March excellent pictures should be obtained of Scandinavia, especially of the ice breaking up in the Gulf of Bothnia. On about the 14th January the frequency was changed from 137.4 MHZ to 137.85

Meteor 30 80-51A 137.02 MHZ

Interesting pictures are still being obtained from this old veteran and still worth looking for.

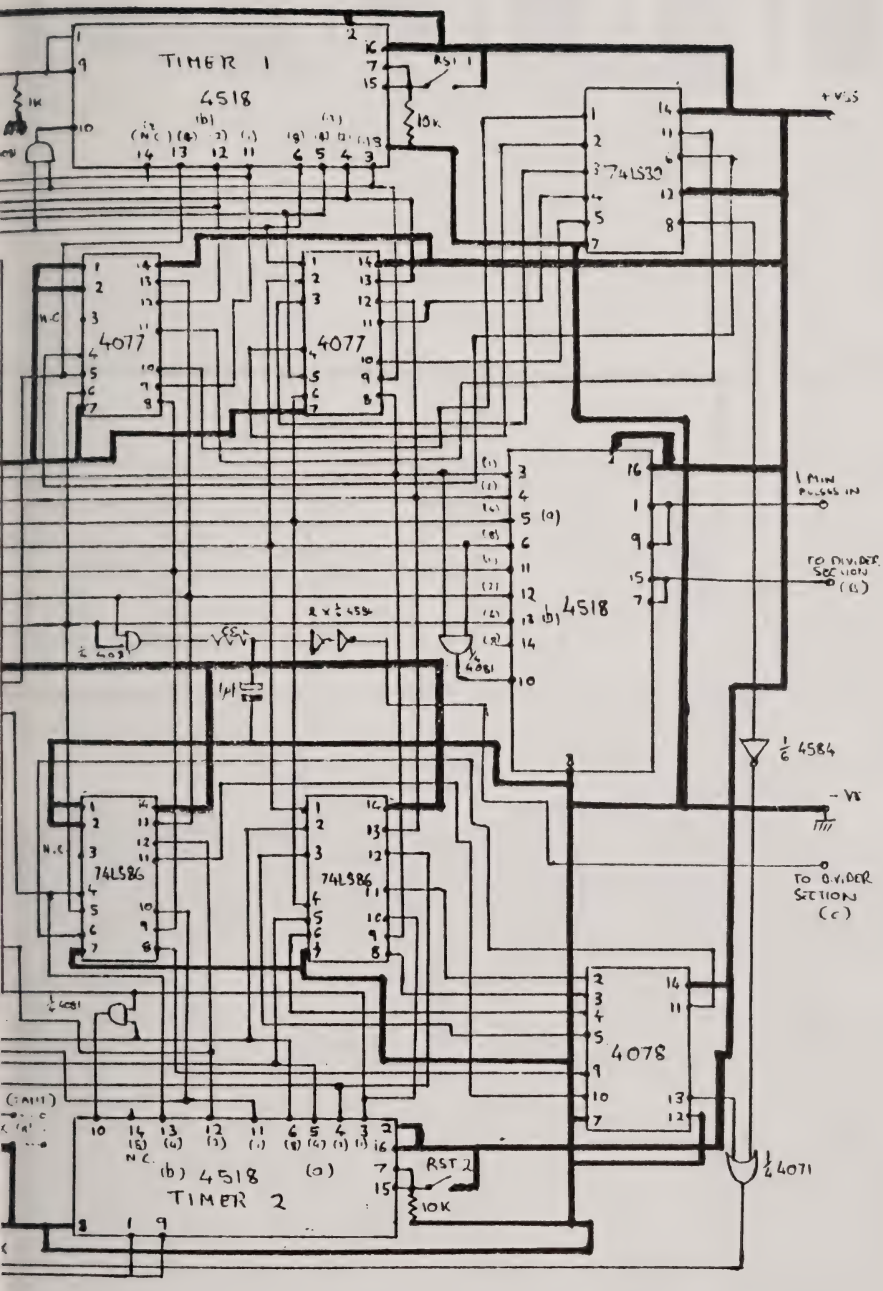
Once again a change of frequency has occurred, at some period in December the frequency was changed from 137.06 to the new frequency of 137.02 MHZ. This is now the 4th change since launch, when the frequency was 137.15MHZ.

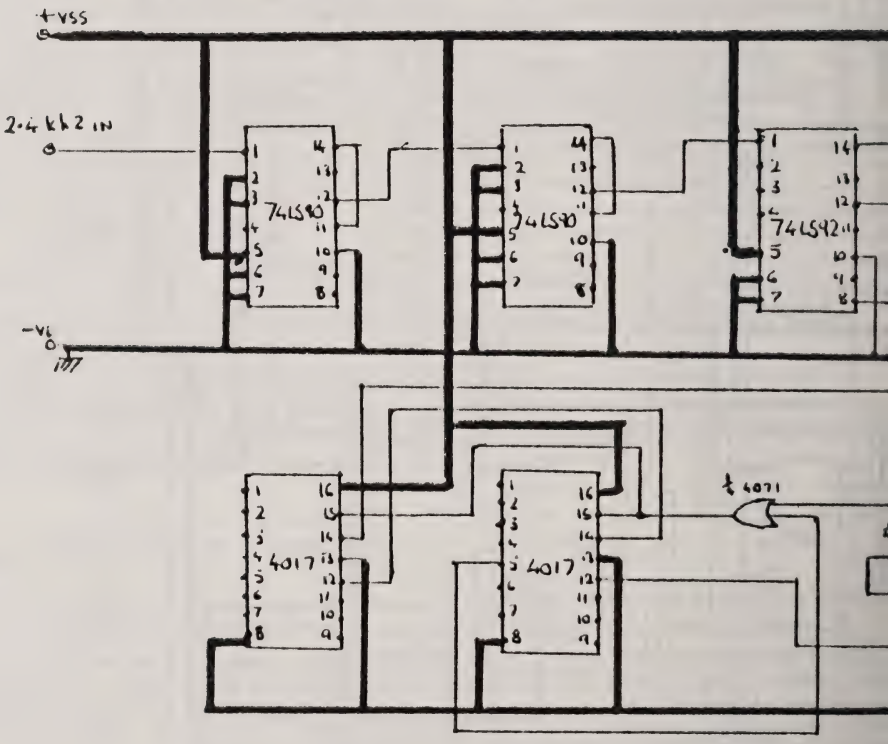
Meteor 3.1 85.100A 137.4 MHZ.

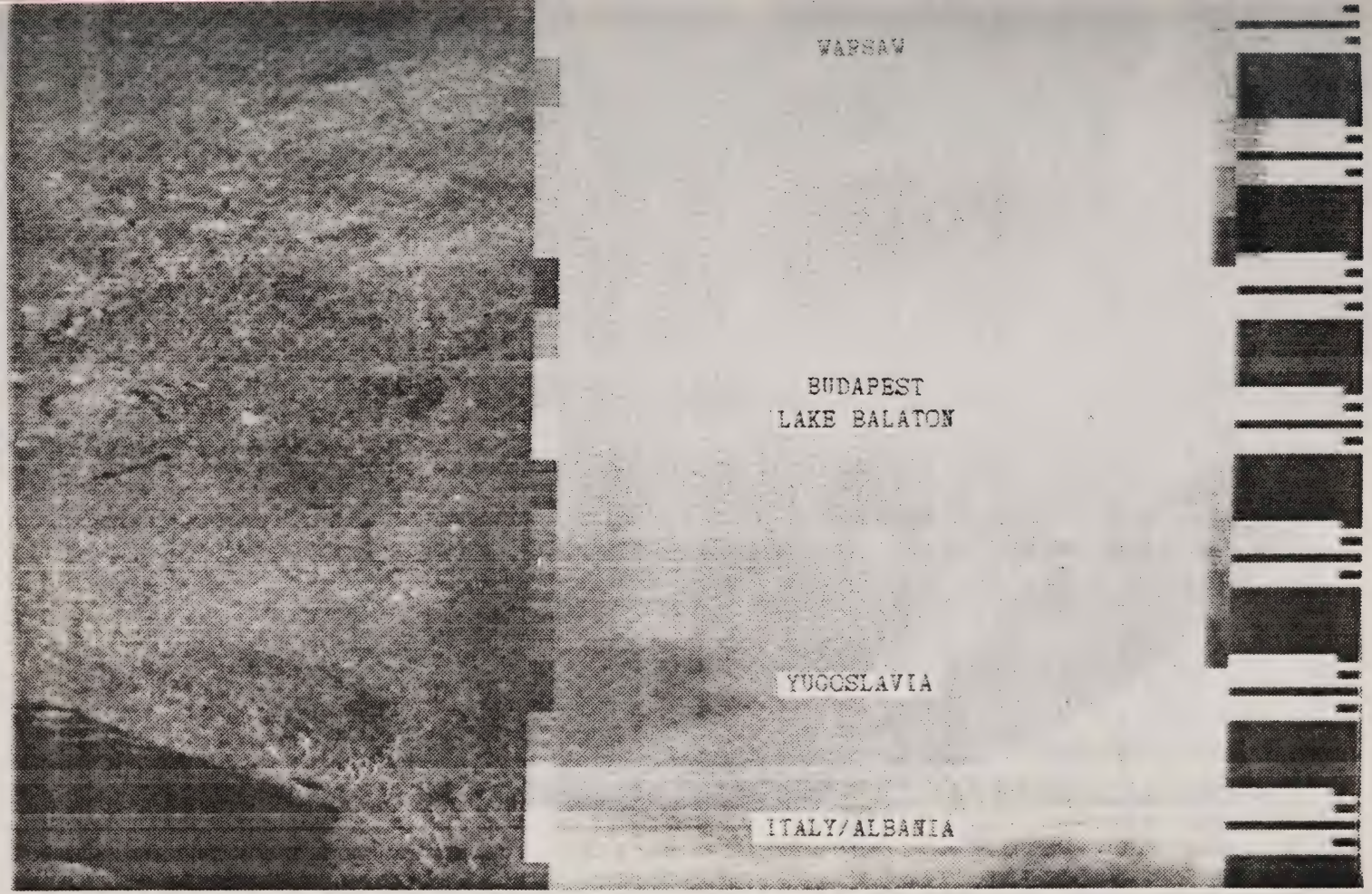
Meteor 3.1 appears to have overcome the complete loss of picture which occurred during November and is now transmitting on a regular basis; in fact it is my belief that it maybe out of control, as since changing frequency to 137.4 MHZ the satellite has been transmitting on every pass even when in complete darkness; sometimes with sync pulse only, and on several occasions with carrier only. Is it possible that it is kept constantly switched to transmit in order to keep it working?

As reported, it has been heard on several occasions when 1766 has been switched on.

The sync bars are still showing sgins of judder but otherwise good pictures.


TIMER 1
4518
RST 1
10K
1K
+VSS
74LS30
4077
4077
4518
1 MIN PULSE IN
TO DIVIDER SECTION (b)
1/6 4584
-VE
TO DIVIDER SECTION (c)
74LS86
74LS86
4078
1/4 4071
(b) 4518 (a)
TIMER 2
RST 2
10K


+Vss
2·4 kHz IN
-V
74LS90
74LS90
74LS92
4017
4017
4071


WARSAW
BUDAPEST
LAKE BALATON
YUGOSLAVIA
ITALY/ALBANIA

For a change as there has been no changes in the status of Noaa 9 and 10, we print the TBUS message for both satellites. (see Newsletters 3 and 4 for more information)

```
NNNN
ZCZC 233 74910
TBUS1 KWBC 101900
APT PREDICT
021335 NOAA   10
PART I
02121 01319 04936 00413 T0117 L2532
21250 23445 10541
21290 91954 25329
21331 60504 35200
NIGHT  PART II
02820 070058  04820 140074  06820 211091
08830 281109  10830 351129  12830 421151
14830 490179  16830 559213  18830 626259
20830 692330  22830 753455  24830 801714
26831 810157  28831 772488  30821 714647
NIGHT  PART III
02825 070026  04835 140010  06838 211006
08838 281024  10838 351044  12838 421066
14838 490093  16848 558127  18848 626174
20848 691244  22848 752367
DAY    PART II
32821 649731  34821 582784  36822 513777
38812 444748  40812 374724  42812 304703
44812 233685  46812 163668  48812 092651
50812 021635
DAY    PART III
52817 049619  54817 120603  56817 190587
58817 261569  60817 331550  62827 401528
64827 471502  66827 540470  68837 608428
70837 674366  72837 737261  74847 790052
76848 813645  78848 786255  80848 731061
82845 668037
PART IV
1986 073A 02110 044052383249 870213011525913 1614059
01012302 01012885 00138883 20437556 07581369 09873065
15568457 07192270 P017662898 P069873452 P000000001
P01092320 M00280147 P07347746 001394550 071073010 9449
0000000000 M00294438 P00099059 P00512100 SPARESPARE
FREQUENCIES  APT 137.50 MHZ, HRPT 1698.0 MHZ, BEACON
DSB 136.77 MHZ.  APT DAY/NIGHT 2,4/3,4. /VIS CH. 2
/0.725 TO 1.0/ AND IR CH. 4 /10.5 TO 11.5/ WILL BE
XMTD DURING S/C DAY.  IR CH 3 /3.63 TO 3.93/ AND CH 4
/10.5 TO 11.5/ WILL BE XMTD DURING S/C NIGHT.  DCS DAY
TIME 005 63436.0.
```

(c2)

NOAA '10' 137.50MHZ PERIOD 101.28855 INC 25.32176 DEG

1/03 174 07:13	30/03 192 08:25	29/04 179 07:34	28/05 172 07:05
2/03 194 08:32	30/03 344 18:32	30/04 174 07:12	28/05 197 08:46
2/03 346 18:40	31/03 187 08:03	30/04 199 08:53	29/05 192 08:24
3/03 189 08:10	1/04 181 07:41	1/05 194 08:31	29/05 344 18:32
3/03 341 18:18	2/04 176 07:19	1/05 346 18:39	30/05 186 08:02
4/03 183 07:48	3/04 196 08:38	2/05 188 08:09	31/05 181 07:40
5/03 178 07:26	4/04 190 08:16	2/05 340 18:17	1/06 175 07:18
6/03 172 07:04	4/04 342 18:24	3/05 183 07:47	2/06 195 08:37
6/03 198 08:45	5/04 185 07:54	4/05 177 07:25	2/06 347 18:45
7/03 192 08:23	6/04 179 07:32	5/05 172 07:03	3/06 190 08:15
7/03 344 18:31	7/04 174 07:10	5/05 197 08:44	3/06 342 18:23
8/03 187 08:01	7/04 199 08:52	6/05 192 08:23	4/06 184 07:53
9/03 181 07:39	8/04 193 08:30	6/05 343 18:30	5/06 179 07:31
10/03 176 07:18	8/04 345 18:37	7/05 186 08:01	6/06 173 07:09
11/03 195 08:37	9/04 188 08:08	8/05 181 07:39	6/06 198 08:51
11/03 347 18:45	9/04 340 18:15	9/05 175 07:17	7/06 193 08:29
12/03 190 08:15	10/04 182 07:46	10/05 195 08:36	7/06 345 18:37
12/03 342 18:23	11/04 177 07:24	10/05 347 18:44	8/06 187 08:07
13/03 184 07:53	12/04 172 07:02	11/05 189 08:14	9/06 182 07:45
14/03 179 07:31	12/04 197 08:43	11/05 341 18:22	10/06 176 07:23
15/03 173 07:09	13/04 191 08:21	12/05 184 07:52	11/06 196 08:42
15/03 199 08:50	13/04 343 18:29	13/05 178 07:30	12/06 191 08:20
16/03 193 08:28	14/04 186 07:59	14/05 173 07:08	12/06 343 18:28
16/03 345 18:36	15/04 180 07:37	14/05 198 08:49	13/06 185 07:58
17/03 188 08:06	16/04 175 07:15	15/05 193 08:27	14/06 180 07:36
17/03 340 18:14	17/04 195 08:35	15/05 345 18:35	15/06 174 07:14
18/03 182 07:44	17/04 347 18:42	16/05 187 08:06	16/06 194 08:34
19/03 177 07:22	18/04 189 08:13	17/05 182 07:44	16/06 346 18:41
20/03 197 08:42	18/04 341 18:20	18/05 176 07:22	17/06 189 08:12
21/03 191 08:20	19/04 184 07:51	19/05 196 08:41	17/06 341 18:20
21/03 343 18:28	20/04 178 07:29	20/05 191 08:19	18/06 183 07:50
22/03 186 07:58	21/04 173 07:07	20/05 343 18:27	19/06 178 07:28
23/03 180 07:36	21/04 198 08:48	21/05 185 07:57	20/06 172 07:06
24/03 175 07:14	22/04 193 08:26	22/05 180 07:35	20/06 197 08:47
25/03 194 08:33	22/04 344 18:34	23/05 174 07:13	21/06 192 08:25
25/03 346 18:41	23/04 187 08:04	23/05 199 08:54	21/06 344 18:33
26/03 189 08:11	24/04 182 07:42	24/05 194 08:32	22/06 186 08:03
26/03 341 18:19	25/04 176 07:20	24/05 346 18:40	23/06 181 07:41
27/03 183 07:49	26/04 196 08:40	25/05 188 08:10	24/06 175 07:19
28/03 178 07:27	27/04 190 08:18	25/05 340 18:18	25/06 195 08:39
29/03 172 07:05	27/04 342 18:25	26/05 183 07:48	25/06 347 18:46
29/03 198 08:47	28/04 185 07:56	27/05 177 07:27	26/06 190 08:17

All morning passes are southbound, all evening passes are northbound.

We have included some evening passes, which are about overhead UK.

NOAA '9' 137.62MHZ PERIOD 102.077833 INC 25.5180418 DEG

1/03	183	03:21	30/03	333	13:24	30/04	350	14:34	30/05	344	14:13
1/03	337	13:34	31/03	331	13:13	1/05	348	14:23	31/05	189	03:49
2/03	181	03:10	1/04	353	14:44	2/05	345	14:12	31/05	342	14:02
2/03	334	13:23	2/04	351	14:33	3/05	189	03:48	1/06	186	03:38
3/03	331	13:12	3/04	348	14:22	3/05	342	14:01	1/06	339	13:51
4/03	354	14:43	4/04	345	14:11	4/05	186	03:38	2/06	183	03:27
5/03	351	14:32	5/04	189	03:48	4/05	339	13:50	2/06	336	13:40
6/03	348	14:21	5/04	342	14:00	5/05	183	03:27	3/06	333	13:29
7/03	346	14:10	6/04	187	03:37	5/05	337	13:39	4/06	331	13:18
8/03	190	03:47	6/04	340	13:49	6/05	181	03:16	5/06	353	14:49
8/03	343	13:59	7/04	184	03:26	6/05	334	13:28	6/06	351	14:38
9/03	187	03:36	7/04	337	13:38	7/05	331	13:17	7/06	348	14:27
9/03	340	13:49	8/04	181	03:15	8/05	354	14:48	8/06	345	14:16
10/03	184	03:25	8/04	334	13:27	9/05	351	14:38	9/06	189	03:53
10/03	337	13:38	9/04	331	13:17	10/05	348	14:27	9/06	342	14:06
11/03	181	03:14	10/04	354	14:48	11/05	346	14:16	10/06	187	03:42
11/03	335	13:27	11/04	351	14:37	12/05	190	03:52	10/06	340	13:55
12/03	332	13:16	12/04	349	14:26	12/05	343	14:05	11/06	184	03:31
13/03	355	14:47	13/04	346	14:15	13/05	187	03:41	11/06	337	13:44
14/03	352	14:36	14/04	190	03:52	13/05	340	13:54	12/06	181	03:20
15/03	349	14:25	14/04	343	14:04	14/05	184	03:31	12/06	334	13:33
16/03	346	14:14	15/04	187	03:41	14/05	337	13:43	13/06	331	13:22
17/03	344	14:03	15/04	340	13:53	15/05	182	03:20	14/06	354	14:53
18/03	188	03:40	16/04	185	03:30	15/05	335	13:32	15/06	352	14:42
18/03	341	13:52	16/04	338	13:42	16/05	332	13:21	16/06	349	14:31
19/03	185	03:29	17/04	182	03:19	17/05	355	14:52	17/06	346	14:20
19/03	338	13:42	17/04	335	13:31	18/05	352	14:41	18/06	190	03:57
20/03	182	03:18	18/04	332	13:20	19/05	349	14:31	18/06	343	14:09
20/03	335	13:31	19/04	355	14:52	20/05	346	14:20	19/06	187	03:46
21/03	333	13:20	20/04	352	14:41	21/05	344	14:09	19/06	341	13:59
22/03	330	13:09	21/04	350	14:30	22/05	188	03:45	20/06	185	03:35
22/03	355	14:51	22/04	347	14:19	22/05	341	13:58	20/06	338	13:48
23/03	353	14:40	23/04	344	14:08	23/05	185	03:34	21/06	182	03:24
24/03	350	14:29	24/04	188	03:45	23/05	338	13:47	21/06	335	13:37
25/03	347	14:18	24/04	341	13:57	24/05	182	03:24	22/06	332	13:26
26/03	344	14:07	25/04	185	03:34	24/05	335	13:36	23/06	330	13:15
27/03	189	03:44	25/04	339	13:46	25/05	333	13:25	23/06	355	14:57
27/03	342	13:56	26/04	183	03:23	26/05	330	13:14	24/06	352	14:46
28/03	186	03:33	26/04	336	13:35	26/05	355	14:56	25/06	350	14:35
28/03	339	13:45	27/04	333	13:24	27/05	353	14:45	26/06	347	14:24
29/03	183	03:22	28/04	330	13:13	28/05	350	14:34	27/06	344	14:13
29/03	336	13:35	29/04	353	14:45	29/05	347	14:24	28/06	188	03:50

All morning passes are southbound, all evening passes are northbound.

We have included some evening passes, which are about overhead UK.

Received on 6835 Khz 425 shift 50 baud

NNNN

ZCZC 234 74911
TBUS2 KWBC 101900
APT PREDICT
021334 NOAA 9
PART I
01190 013 16 02849 02099 T0204 L2551
11942 31708 12306
11980 60526 23486
12021 25345 33278
DAY PART II
02860 069228 04860 139244 06860 209262
08860 279280 10860 348300 12860 417323
14870 486350 16870 554385 18870 621431
20870 686500 22870 746620 24870 795859
DAY PART III
02865 069196 04875 139179 06875 209162
08875 278144 10875 348124 12875 417101
14875 485074 16885 553040 18888 620006
20888 685074 22888 745192 24888 794427
26888 808843 28877 777192 30877 721367
NIGHT PART II
26861 808278 28861 775623 30861 720795
32862 656712 34862 590655 36852 522615
38852 454584 40852 384559 42842 315538
44842 245519 46842 175501 48842 105484
50842 034468
NIGHT PART III
52847 035452 54847 105435 56847 175418
58857 245401 60857 315381 62857 385360
64867 454335 66867 522304 68867 590264
70877 656208 72877 719117 74877 775946
PART IV
1984 123A 11181 044048704681 870213011008084 1600780
01020201 01020775 00153150 19504776 00874352 09903348
16503152 07229664 P071618558 P011014893 P000000000
P00171749 M01150467 P07321140 006201157 071073010 9449
0000499999 M00285545 P00100623 P00508135 SPARESPARE
FREQUENCIES APT 137.62 MHZ, HRPT 1707.0 MHZ, BEACON
DSB 137.77 MHZ. APT DAY/NIGHT 2,4/3,4. /VIS CH. 2
/0.725 TO 1.0/ AND IR CH. 4 /10.5 TO 11.5/ WILL BE
XMTD DURING S/C DAY. IR CH 3 /3.63 TO 3.93/ AND CH 4
/10.5 TO 11.5/ WILL BE XMTD DURING S/C NIGHT. DCS DAY
TIME 005 2636.0.
NOTE EFFECTIVE 11/17/86 THE NOAA 6 S/C WILL BE PLACED
IN STANDBY STATUS WITH APT AND HRPT OFF. TBUS3 WILL
BE DISCONTINUED U.F.N.

GULF

OF

BOTHNIA

HELSINKI

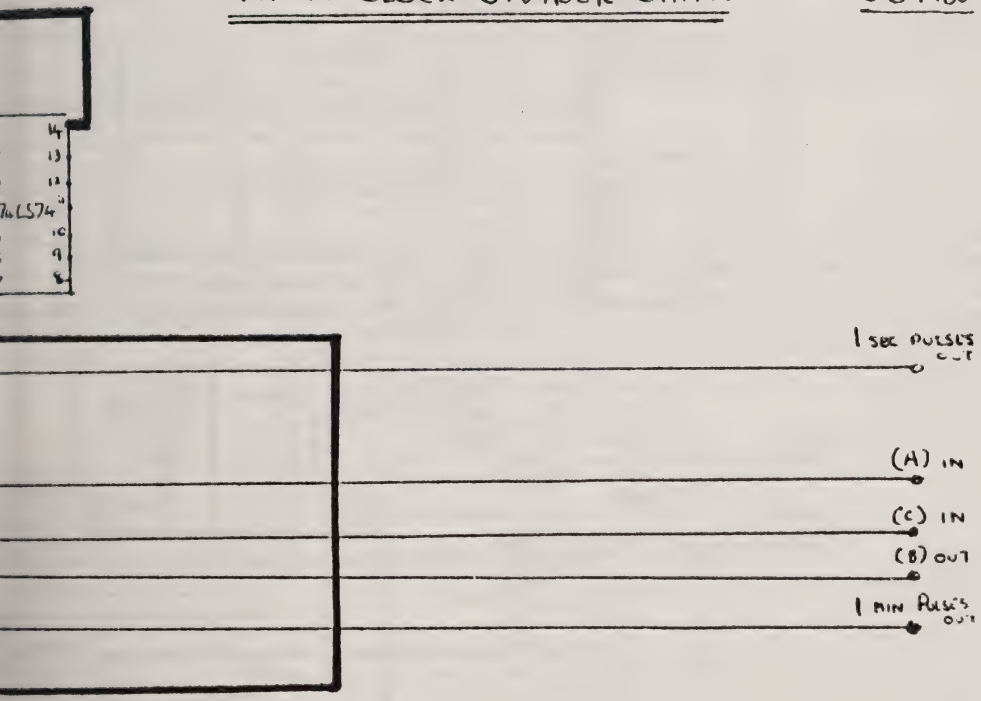
STOCKHOLM

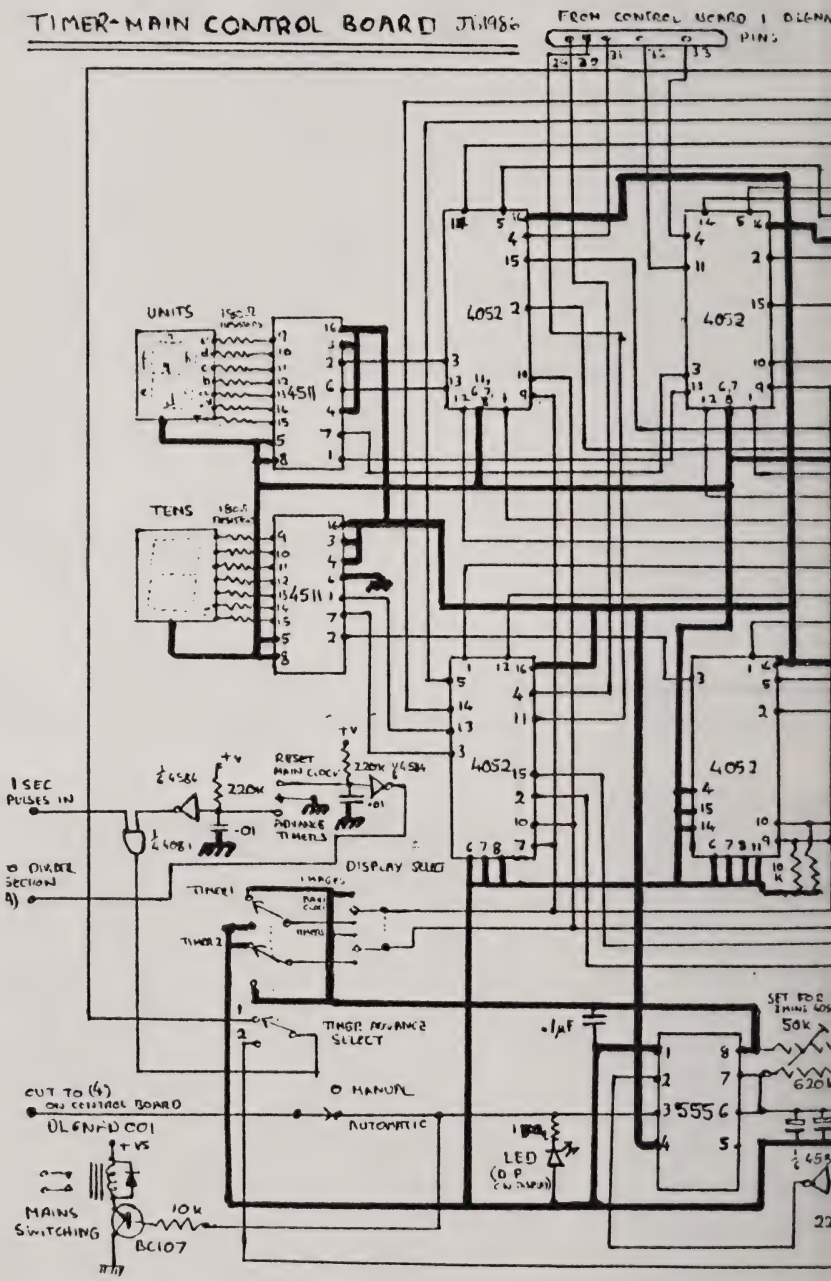
GOTLAND

GDANSK

TIMER - CLOCK DIVIDER CHAIN

JB 1986




TIMER-MAIN CONTROL BOARD JUNE 86
FROM CONTROL BOARD 1 DIGNA
PINS
UNITS
TENS
4511
4052
4081
4584
1 SEC PULSES IN
RESET MAIN CLOCK
ADVANCE TIMERS
DISPLAY SELECT
TIMER 1
TIMER 2
TIMER ADVANCE SELECT
MANUAL
AUTOMATIC
OUT TO (4) ON CONTROL BOARD
OLGND COI
MAINS SWITCHING
BC107
LED
555
50k
620k
10k
.1μF
.01
220k

Cosmos 1500 and 1602

No signals have been received for several months now. Any reports would be most welcome.

Cosmos 1766 86-55A 137.4 MHZ

Very few transmissions have been heard from this Radar Sat. since November. This is still a satellite which should be listened for, being a new generation of oceanographic Radar satellites.

Rev. James Brown reports a picture on the 10th of January consisting of visible and Radar and the usual Meteor figures of time and grey scale.

In R.I.G. 7, Terry Weatherly gave a good write up of this satellite; one of the pictures in the centre fold shows in some detail the piano key coding mentioned in his article.

Meteor 2-14 86.039A 137.85MHZ

Due to other commitments during the early morning it has not been possible to monitor this satellite. Peter Wakelin from the Kettering group reports reception normal on the 6th of January but at the time of writing no signals have been heard, although light conditions should have been sufficient for transmissions. By the time this is printed good afternoon passes should be possible.

The Kepler elements for these satellites are overleaf.

KEPLER ELEMENTS provided by Carol Durows
EARTH SATELLITE RESEARCH UNIT, UNIVERSITY OF ASTON

	MET 3/1 137.85 mHz 85-100 A	MET 2/13 137.40 mHz 85-119 A	MET 1/30 137.06 mHz 80-51
EPOCH OF DATA	87039.09096649	87028.93211886	87032.24274672
ACCELERATION	0.00000043	0.00000117	0.00001167
REV NO	6231	5517	36176
INCLINATION	82.5486	82.5322	97.7278
R. A. NODE	123.9447	191.7164	121.5933
ECCENTRICITY	0.0018312	0.0015553	0.0041614
ARC OF PERIGEE	288.2082	221.4417	259.7781
MEAN ANOMALY	71.7046	138.5537	99.8715
MEAN MOTION	13.16945542	13.84010692	14.97881637

	COSMOS 1766 137.4 mHz 86-55 A	NOAA 9 137.62 mHz 84-123 A	NOAA 10 137.50 mHz 86-73 A
EPOCH OF DATA	87029.17777087	87037.95240761	87026.53791918
ACCELERATION	0.00000088	0.00000057	-0.00000020
REV NO	2714	11265	1860
INCLINATION	82.5259	99.0312	98.7372
R. A. NODE	120.2794	2.6040	58.4610
ECCENTRICITY	0.0025208	0.0014654	0.0012766
ARG OF PERIGEE	49.2728	212.4997	258.0432
MEAN ANOMALY	311.0666	147.5272	101.9314
MEAN MOTION	14.73462876	14.11474705	14.22485125

	MET 2/15 137.85 MHZ 87-1 A
EPOCH OF DATA	87018.71129507
ACCELERATION	0.00000006
REV NO	186
INCLINATION	82.4675
R. A. NODE	139.8621
ECCENTRICITY	0.0012601
ARG OF PERIGEE	202.0893
MEAN MOTION	157.9730
MEAN MOTION	13.83551329

Timer Circuit for automatic reception of METEOSAT images.

by James Brown

In the spring of 1985 issue of VHF Communications (a German based Radio and electronics magazine) DL6 NAD published a design for a multiple image storage, based on the tried and proven YU3UMV design, so beloved of RIG members. This had the capability of storing up to 10 images at a time. If for example 10 x D2 formats were fed in one after another, the circuit could then relay them at such a high speed as to make it possible to see the atmosphere in motion. I'm sure that many others like myself have successfully built up the design and have been delighted with the results.

However the joy of seeing the "movies" was some what offset by the chore of leaping up and down to switch on the receiver every time the desired image came up! After surveying the market for a suitable time chip the author concluded that there was nothing available that was flexible enough to deal with all the possibilities of the METEOSAT transmissions. So with CMOS Cookbook in hand, the following circuit was designed. Whilst the DL6 NAD circuits were particularly in mind, I think RIG members will find it suitable or adaptable to most setups.

The circuit provides a swiching output at up to twice an hour, for any presettable times, and for the duration of a single METEOSAT frame, ie. about 3mins, 40 sec. This output is initially simply a logic "1" at +5v, but also switches a relay for tape-recorder or receiver powering. In addition, it has a display unit which not only gives a readout of all the timers, but can also show which memory bank is being accessed at any time, useful for fault finding.

The design is fairly straight forward, CMOS counters are used as clock counters, and the logic chips simply detect when an output from the main clock matches that from one of the pre-set clocks. The 555 in monostable mode is then triggered for a period set by the R/C network. 4052 multiplexers are used to interface all the counter output to 4511 LED drivers, and a simple 2 bit binary word selects which line are fed to the display. Hence a couple of toggle switches are all that are required to select the different displays. The output of the 555 can be used via a BC107 to interface a low-power relay to switch mains to other devices. The inputs marked from the DL6 NAD control board should be taken to earth if not used or possible to the data seclection lines if some other system of RAM board. In any case all input logic "1" s should be no higher than +5v.

The circuits can be found in the pull-out centre section.

The only oddities to note are the delays put in some of the logic output lines. This resulted from several hair-testing nights when the author discovered that there are fractional overlap states in the counter outputs, which can lead to false re-sets and triggering. The short delays ensure that only valid output states are acted upon. The design may also seem to be an odd mixture of CMOS and LS74 chips, this is simply because chips that were to hand were used. A new design might well use all CMOS, so feel free to adapt things. It should be noted that the master clock derives its input from a sub- divided continuous 2.4 kHz signal, which should for obvious reasons be from a crystal source rather than satellite. This was chosen as it was felt that most set-ups would already have this output somewhere. I'm indebted to Les Currington (G8LOK) for his encouragement and comments and in particular for his confirmation that having built up the circuit directly from the circuit diagram, that it actually works !

Provided that construction of the circuit has been correctly undertaken, the setting up is quite simple.

1) Switch the display to timer 1. Press the reset for timer 1 and the display should read 00. Then press the timer advance switch and the display should show the timer incrementing one minute for every second the switch remains pressed. When the required time is reached, release the switch.

2) Switch the display to show timer 2 and repeat the procedure. If two seperate outputs per hour are not required, then simply set the second timer to the first timer time setting.

3) Switch the display to show the master clock, and then with reference to some accurate time source, press the master reset exactly on the hour-and that's it!

4) the R/C time constant of the 555 will need to be set up by experiment initially, and if the output is sent as per the circuit to a spare decimal point on the display, then the "on" period can easily be set. The author has found that by using tantalum capacitors and metal oxide resistors even for this long timing period, from the cold to running warm, the variation in output is only a few seconds at most, and as the inter-frame period of METEOSAT is in excess of 20 seconds, there should be no problems.

I'm sure RIG members will have no problems in adapting the circuit to their own requirements. For example, a 4017 before the 555 could be used to select longer time intervals than an hour between operations, which together with a larger time constant on the 555 could make it suitable for NOAA recordings etc.....So happy soldering!

BEGINNERS QUESTIONS AND ANSWERS by Gordon G8RIA

Q. How much will it cost me to set up a basic weather satellite receiving station ?

A. The cost would vary depending on how sophisticated you wished your initial system to be, but using some R. I. G. items your costs should look something like this:- VHF Scanning Receiver 92.00, self build Framestore 70.00+, Mast head Pre-amp 12.00, B/W monitor 50.00- 80.00 crossed Dipole Aerial 30.00. other misc,items 30.00.
These costs can be reduced somewhat if you shop around but a word of warning, poor quality components will only add to your problems of increased noise on the signal, and the wrong kind of snow showing up on your monitor screen!

Q. Is it o.k. to use a scanner receiver such as a AR2001 for weather satellite signal reception.?

Yes, but the receiver must be capable wide band operation, and not add too much extra noise to the signal being received. Results are much better with a purpose built and aligned receiver.

Q. Which is best?, A receiver with crystals for each appropiate frequency, or a receiver with conventional tuning.

A. A mixture of both would be ideal, selecting the crystals frequencies for time-switch/tape recorder use, and conventional tuning methods at times when you are experiencing signal drift, AFC is essential if you want good results.

Q. Do I need special licence to receive weather satellite signals?.

A. According to U.K. licencing conditions strictly speaking yes, but the Remote Imaging Group are hoping to get blanket approval from the licencing authorities for it's members, more on this later.

Q. I want to use photographic methods to print weather pictures can you help?

A. See newsletter number 5, Colin Hall's article, we are hoping to get one of our members to write a series of articles on how to convert a Muirhead Fax machine to produce photographic quality prints, but I stress this will of necessity involve some previous electronic and mechanical experience of constructing similar projects.

Q. What resolution can I expect from the YU3UMV framestore, and is it possible to increase this in any way?.

A. 256 by 256 pixels is the current resolution, but we understand that Martelec are going to introduce a new 512 by 512 pixel version in 1987 which will use a BBC micro and have 8 planes and lots of new features, sounds exciting contact Martelec (not R.I.G.) for further details.

Q. Do I qualify for a discount on my subs if I introduce new members?.

A. No, but what you are asking is worthy of consideration by the R.I.G. committee at a future meeting, so keep your eyes pealed in future newsletters to see what they decide.

Q. I heard through a friend that you are thinking of introducing a bulletin board for use of members of the group, will I be able to access all previous R.I.G. newsletters articles ?.

A. We have not fully decided what will be put on the bulletin board, but the aim is to carry as much news as possible wrapped around by articles from previous newsletters, constructional items are difficult to carry without detailing all mods so it most likely that for this type of article you will have to rely on back issues either bought or borrowed from friends.

Q. I have a lot of questions I would like answered about Remote Imaging too many I think for your Q. and A. pages, what do you recommend I do?.

A. We attend quite a few rallies during the course of the year, choose a time when the stand is not so crowded and come up and ask us direct, It would be helpful to write your questions down on a piece of paper, before you set out for the rally which may save your time and ours, books on the subject are available and these may provide some of the answers you seek.

Q. Is it possible to get answers over the telephone from R.I.G.

A. Yes but we have a problem, at the moment certain committee members are inundated with calls on their own home telephones and friends are having difficulty contacting them, so we have decided to get another line from British Telecom to ease the problem, information will be published when B.T. have provided the line.

Q. Who should I send my letters to for inclusion in your Q. and A. pages?.

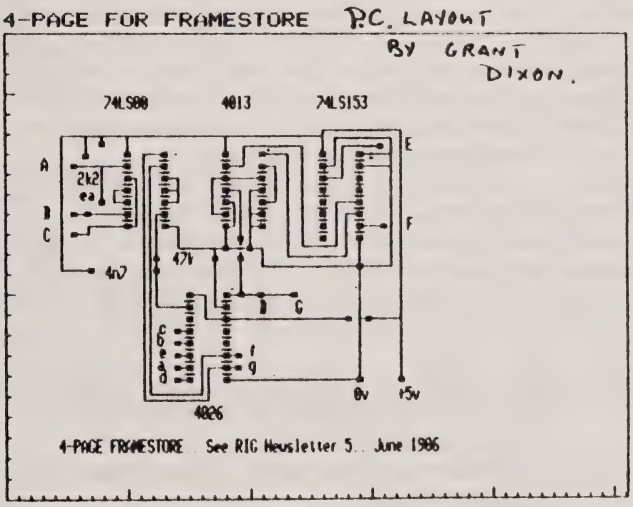
A. Address them to the Newsletter editor, Phil Seaford, 14, Nevis Close, Leighton Buzzard, Beds LU7 7XD..

Q. What construction projects do R.I.G. intend to cover in future newsletters?.

A. A lot depends on what our members come up with, why don't you write in and let us know what sort of subjects you would like to see covered and we will do our best.

Q. I have some stepper motors which I would like to drive a cylinder to make a weather fax machine, but I an more accomplished mechanic than electronics expert, could you do a feature in the Newsletter which is describing in simple, terms possible with circuit diagrams how I should proceed?.

A. Now that stepper motors are available at rallies at knock down prices there are lots of uses they can be put to particularly the one you have in mind. You did not say what voltage your motors are so perhaps we should do an article which covers various types. Lot's of other R.I.G. members will be interested in this so watch future issues of Newsletters.



BRACING A DISH by Chris Meadows G4KWH

Having negotiated via telephone the purchase of a factory soiled 1.5m dish for $50.00, when it was delivered by parceline I thought it must be a 2m diameter dish as it seemed so large. The first thing to do was to chose a South facing house wall and then devise some kind of structure to brace 1.77 square meters of aluminium against the strong winds of Bedford. The wall choice was easy, the bracing bit wasn't. Two heads are better than one so I asked Terry G6TAH to brain storm with me.

In two minutes we came up with the idea of using a length of 1" electricians metal conduit suitably rolled into a circle of diameter 1m. Also conduit distance saddles were used to bolt the ring of conduit to the dish in seven places. The conduit once bolted to the dish made the assembly sufficiently rigid to function as an aerial but with just enough compliance to inhibit bolt shear between the dish and conduit rings. We now had to mechanically fix the conduit ring and the now attached dish to a four foot mast, which had previously been fitted to the wall by 18 inch T and K brackets. This was achieved by fashioning four supports made from 3/16x3/4x9 inch mild steel stock. These were bent, twisted and drilled, so that they could be bolted to two pairs of saddles which had been stragtegically poistioned at the top and bottom portions of the dish. At this point look at photograph, there is a prize for noticing that the dish was upside down. The twist in the stock allowed two lengths of aluminium tube, strenghtened with a inner threaded steel stud, to be screwed to each support pair.

A Tee-piece was used to connect a futher length of tube to the lower horizontal tube at its mid point, so that it could be clamped, at its other end, to a swivel clamp for elevation adjustment. The top horizontal bar was bolted to the mast using a Halbar plate clamp, again see photograph (in next newsletter); right way up this time.
(The wooden frame served only as transport packing, but was kept in place until commissioned by a celebrity)

Different values of elevation and azimuth are easily acccommodated by using the two clamps as stated.

The dish was primed with zinc chromate (a must for aluminium), undercoated and painted black. The dish was fixed at first floor height and much to my delight was thought ghastly by a few of my neighbours who had North facing windows to my South.

Costs:
- 4m length of conduit £11.00 (Your local Technical College will probably do the rolling).
- 7 saddles £7.00.
- Aluminium nuts and bolts (large head 1x1/4) £1.50
- 2 clamps £6.00
- Tube and steel threaded stud £6.00.
- Paint £10.00.

SUB-SATELLITE POINT PROGRAM by David Bailey

The following program has been sent in by David Bailey who uses it to print out for one orbit the ground track of a polar orbiting satellite such as NOAA 9 & 10 and the Russian weather satellites.

David finds the program handy when producing 'plots' when he sets the ASC. NODE to 0 degrees (LINE 50) and the plotting interval to 2 minutes (LINE 70).

Its wriiten for the DRAGON-32 but should be adaptable for most PC's.

```
 10 CLS:PPINT: PRINT" SUB-SATELLITE POINT": PRINT" FOR CIRCULAR ORBITS"
  :PRINT
 20 REM***SSP LAT***
 30 INPUT"SATELLITE PERIOD (MINS)";TT
 40 INPUT"SATELLITE INCLINATION (DEGS)";J
 50 INPUT "LONGITUDE OF ASCENDING NODE";RL
 60 RL=360-RL
 70 INPUT" TIME INTERVAL BETWEEN PLOTS (MINUTES)";ST
 80 TK=ST
100 CLS:PRINTTAB(0)" TIME SINCE LAST"TAB(18)"DEGS"TAB(26)"DEGS"
110 PRINTTAB(0)"ASCENDING NODE."TAB(18)"LAT."TAB(26)"LONG."
120 PRINT
130 FOR N=0 TO TT/ST
140 I=J*3.142/180
150 AA=SIN(6.284*TK/TT)
160 AB=SIN(I)
170 X=AB*AA
180 Y=ATN((X)/SQR(-X*X+1))
190 LA=Y*180/3.142
200 REM***SSP LONG***
210 BA=COS(6.284*TK/TT)
220 BB=COS(Y)
230 Z=BA/BB
240 Q=1.570935-ATN((Z)/SQR(-Z*Z+1))
250 RR=Q*180/3.142
260 IF J>90 THEN N2=0
270 IF J<90 THEN N2=1
280 LO=RL-((-1^N2)*RR-(TK/4)
290 LO=360-LO:IF LO<0 THEN LO=LO+360
300 IF LO>360 THEN LO=LO-360
310 IF LA>0 THEN PRINTUSING "£££.£ MINS.       £££.£N ££££.£W";TK,LA,LO
   ELSE LA=LA*-1: PRINTUSING"£££.£ MINS.       £££.£S ££££.£W";TK,LA,LO
320 TK=TK+ST
330 NEXT N
```

Dear Phil,

I read with interest the article submitted by Peter G6JFN on prediction calculations by computer and wrote this program to run on my Commadore C64 and thought it may be of interest to the other members, it is purely an extension of Peter's program put in to question and answer form.

When the program is run the data constants, inclination and period, are displayed along with the satellite numbers and the transmission frequencies, inclination and period will of course have to be up dated from subsequent newsletters. I have left 39 program lines free between the lines 60 and 100 for the insertion of further satellite information if required.

The program as written predicts only the more favorite passes, by omitting lines 330, 340 and 350 all the orbits are displayed if required. The information is presented in three columns, day/month, equatorial crossing angle, equatorial crossing in hours and minutes, the angle, hours and minutes are rounded up to whole numbers in the line 370 by the statement INT (ED), INT (EH) and INT (EM)

The main disadvantage of the read out is that after the last day of the month has been displayed ie 31/12, the computer carries on counting from 31 and so 32 becomes 1st Jan. and the month remains at 12, a simple subtraction of the number of days in the previous month from the number shown gives the correct date ie 42 less 31 (number of days in December) gives the 11th Jan. Alternatively the data for 1st Jan could be entered in the program from the newsletter information.

The predictions are correct to 1 degree equatorial crossing angle and 1 minute of crossing time which is accurate enough for a receiving station like mine which utilises a fixed crossed dipole antenna and a receiver/tape recorder which can be turned to switch on at a pre-determined time in the absence of an operator.

Yours sincerely

Ken Mills

SATELLITE ORBIT PREDICTIONS FOR RUNNING ON COMODORE C 64.

PROGRAM.

```
  10 PRINT"**"
  20 PRINT  SPC (6) "R/ SATELLITE ORBIT PREDICTIONS = " : PRINT
  30 PRINT  SPC (8) "R/ SATELLITE ORBITAL DATA =": PRINT
  35 PRINT  " SAT.      FREQUENCY  INCLINATION   PERIOD "
  40 PRINT SPC (9)" (MHZ)        (DEGREES)     (MINUTES)" : PRINT
  50 PRINT "NOAA 9    137.62       25.5184976     102.079247"
  60 PRINT  NOAA 10   137.5        25.32225       101.2889 ": PRINT
 100 PRINT  SPC (3) " ENTER  INCLINATION  IN  DEGRLES"
 120 INPUT F : PRINT
 140 PRINT SPC (3) " ENTER PERIOD IN MINUTES"
 150 INPUT G : PRINT
 160 PRINT SPC (3) " ENTER EQUATORIAL CROSSING IN DEGREES"
 170 INPUT C : PRINT
 180 PRINT SPC (3)" ENTER EQUATORIAL CROSSING IN HOURS "
 190 INPUT D : PRINT
 200 PRINT SPC (3) " ENTER EQUATORIAL CROSSING IN MINUTES "
 210 INPUT E : PRINT
 220 PRINT SPC (3) "ENTER MONTH (1-12) "
 230 INPUT A : PRINT
 240 PRINT SPC (3) " ENTER DAY"
 250 INPUT B : PRINT
 260 INC = F
 270 PER = G
 280 WM =A : WD =B : ED =C: EH=D : EM =E
 290 PER = PER /60
 300 EH = (EM/60 )+ EH
 310 ED =ED + INC : IF ED > 360 THEN ED =ED -360
 320 EH =EH +PER : IF EH > 24 THEN EH = EH -24 :WD=WD +1
 330 IF ED < 359 AND ED > 330 THEN GOTO 360
 340 IF ED < 200 AND ED > 170 THEN GOTO 360
 350 GOTO 310
 360 EM = (EH-INT (EH) ) * 60
 370 PRINT WD"/"WM;"    "; INT(ED); "       ";INT(EH);":";INT(EM)
 380 GOTO 310
```

PROGRAM NOTES.

Line 10 Heart (**) obtained by shifted CLR/HOME
Lines 10 and 20 R/ obtained by CTRL REVON, = by CTRL REVOFF
Line 35 spaces between words in order: 3 spaces, 2 spaces, 2 spaces
Line 40 5 spaces, 2 spaces
Line 50 3 spaces, 3 spaces, 2 spaces
Line 60 2 spaces, 4 spaces, 4 spaces
Line 370 5 spaces, 4 space

DON'T OVERCOOK YOUR CHIPS by Peter Wakelin

As well as focussing radio waves a parabolic dish will also concentrate a large amount of heat energy should it be pointed towards the sun. An accurate, shiny, aluminium dish one metre in diameter will concentrate enough heat to destroy most electronic components, set fire to plastics and possible melt solder.

From any point on earth all geostationary satellites appear to lie on an arc within 9 degrees of the celestial equator. (The path of the sun across sky at the equinoxes, March 21 and September 23 marks the celestial equator.) As the sun moves as much as 23 degrees from the equator during the course of its annual cycle it follows that all dishes pointing at geostationary satellites will also be pointing at the sun at the same time.

It is therefore essential to take some precautions to prevent serious damage, especially when an expensive pre-amp or down-converter is placed as close to the focus as possible to reduce energy losses. Ideally the metallic surface of the dish should be coated with a rough, non shiny material to scatter or absorb as much heat as possible. Cork or plastic chips glued to the surface,sealed with a water repellent substance and finished with dark matt paint is a prefect solution.

As the risk of damage is confined to two short periods a year a less permanent solution can be achieved by by simply covering the dish surface with a suitable piece of cloth at the appropriate time. The greatest risk occurs N days before the spring equinox and N days after the autumnal equinox where N = 23 x SIN latitude but damage is is likely for 2 or 3 days before and after these dates. For central England at 53 degrees north the dates are March 3 and October 11 and for Capetown and Sydney at about 34 degrees south the dates are September 10 and April 3.

Peter is shortly off to a tour of duty in the Falklands and has promised to send in some imagery of that part of the world.
We look forward to printing them.

Ed.

SATELLITE RECEPTION IN PLYMOUTH

by Lawrence Harris

Back in spring 1986 I realised that it was within my pocket to build a set-up capable of receiving signals from a number of satellites. Initially my prime interest was the University of Surrey satellites UOSATs 1 and 2 because they transmit astronomical information and I have been an amateur and then a professional astronomer for many years. Until recently I was a spacecraft controller commanding Ariel 5, Ariel 6 and then the IRAS satellite and so the prospect of re-entering the field as an amateur was extremely appealing.

Enquiries about equipment proved extremely frustrating. Nobody answers telephone queries, and sae's are a waste of time! I gave up waiting for a reply from Timestep and similarly even RIG never used my sae but I joined anyway. Eventually I managed to obtain details about aerials, pre-amps, receivers, low loss cable decoders,etc after a lot of effort. The local radio club were were helpful and in particular Joe Jones G1RXR to whom I am indebted.

My first purchase was the Astrid unit for receiving UOSATs 1and 2 and after finding out that there was no available software for my Amstrad 6128 I had to write programs to predict the satellites visibility and also to decode the telemetry. This took some weeks but at least I have some very good software. There is much sotfware written for the BBC computer but the 6128 is a superior machine with twice the memory. Then on to APT.

I found little in the way of published comparisions of the various aerials available so I selected a Jaybeam crossed dipole for the 137 MHz band. Subsequently I bought 154 and 137 MHz Dartcom preamps for the two bands and the Dartcom scanning receiver for the 136-139 MHz. The YU3UMV framestore plus the LOK board for my decoder but many of the alignments have not been done yet because I do not know enough about electronics. I paid for the boards to be constructed. Meanwhile I made a study of low loss cable and after listening to the experts, took their advice and bought 40 metres of UR 67 cable. This I had calculated would be enough for two 18 metre lengths of cable for the 137 and 145 MHz aerials plus enough for a Meteosat 1.69 GHz feed. My house is effectively 3 stories where the cables run.

The result is that I can listen to many satellites in this band though several of them I cannot recognise. With my 137MHz aerial plus preamp mounted on the chimney I can pick up NOAA from somewhere near New Guinea and follow it up to the middle of Greenland, well inside the Arctic circle.

In addition I have built a Meteosat dish {frame by Lwave} though I had to write several letters to them before I got proper construction details. Everyone seems to assume that you know what to do if they just supply pieces of aluminium! After fitting a suitable feeder I then bought a down converter from Microwave Modules. This feeds 137.5 MHz {well not quite! I have found it to be more like 137.52} into the framestore. I am having many problems with this unit and at the moment it is being repaired - and a long time too. I had to build a wooden support for the dish because I cannot do anything with metal. The day came when the receiver was ready, the down-converter ready, and the dish mounted. I worked out to approximately where to point the dish, ie., due south and up at about 25 degrees. I fixed the feed, connected the cable to the receiver and switched on. My excitement was great when I immediately heard a recognisable signal. I made positional ajustments to the dish to maximise it and then switched on the framestore. The wait had been well worth the effort!

So with both NOAA and Meteosat the net result is that I can get perfect pictures assuming that there no interference! That is not often! Sometimes a local motor bike or similiar vehicle ruins the pictures and I don't know why. I had understood that with a tight frequency selective preamp and a good receiver plus a decently mounted receiver that I would be OK but no! I can get utterly perfect pictures that are staggering in their quality - and I can also get total disaster. Also with Meteosat I notice that sometimes the country outlines are not there - presumbly its my equipment not set correctly? Recent discoveries have been satellites I am unfamiliar with providing APT pictures of superb quality. One was picked up on 137.02MHz and produced the most superb picture that I have ever seen. The cities of Milan and Rome were clearly visible. On Sunday 11th Jan I again observed the same { ? } satellite on 137.02 MHz and this time recorded it and checked that it was not on any nearby frequency {I believe the technical term is side band? }. There was no grey scale or any other distinguishing feature except the picture showing from Norway to North Africa.

Overall I am delighted with the results from the equipment but have every sympathy with those just starting off without any knowledge- like me last spring! My advice whould be firstly to seek out the local radio club who might have a resident expert. It is so important to make local contacts. If you have just joined RIG then you are well on the way!

Dear Phil,

The following is tongue in cheek re the use of m instead of M for Mega in your newsletter. I find this very annoying practice that is creeping into printed matter. I have been in electronics professionally since early 1960's and have never seen an official document stating m instead of M for Mega. How would you designate milli? What is 10mV, is it 10 millivolts or 10 Megavolts?

Thank you for another interesting newsletter. There is however one problem I have. Please give me some advice on receiving Wx satellites in the 136-138 milliHertz range (mHz). My calculations show a half wave dipole to be some 1.095 x 10^9m long The mean circumference of the earth is about 40.04 x 10^6m, ie my half way dipole is some 27 times longer than the earth's mean circumference. This is obviously a rather large project for one man and I would suggest an International effort in erecting such an aerial. The wrap around effect on the earth would not be advantageous and the ends of the aerial would ideally have to be supported in the ether in a straight line using sky hooks that will function in a vacuum. However, danger to spacecraft might enaue and so some form of warning device would have to be affixed to minimise the collision hazard.

I would also be grateful if you could tell me the erp of the satellites. This is presumably in the mW range. What kind of power source is used for this? Was a nuclear reactor also launched at the same time to provide this power or has some suitable physical connection been made to the sun in order to obtain these power levels?

As an alternative to these low frequencies and large antennae, possibly it would have been cheaper to provide an umbilical cord to the satellite straight from mother earth!!

73's from M or m
Clive Smith G4FZH.

^ means 'to the power of'

DARTCOM 1.69 GHz METEOSAT DOWN CONVERTER.

This down converter has been designed to convert the signals from METEOSAT CH1 and CH2 automatic picture transmissions on 1.6945 GHz and 1.691 GHz to 137.5 MHz for reception on a standard F.M. V.H.F. weather satellite receiver.

The down converter uses MFG 1202 GaAs FET's as the R.F. amplifier and mixer providing sufficient gain and low noise figure to obtain noise free pictures using the R.I.G. 1 metre dish (or similar), and suitable feed with out the need for a pre-amp.

The unit can be supplied either as a completely assembled and tested down converter in a weather proof box, or as an assembled and tested module mounted in a tin plate box.

The converter has been desinged to be mounted in close proximity to the dish with all power and channel changeover facilities being supplied by the single coax cable connecting the down converter to the V.H.F. receiver.

If no D.C. supply feed via the coax feeder is avaible then the complete boxed converter can be supplied with a waterproof power and channel changeover connector.

The converter can also be supplied to receive the Advanced Very High Resolution Radiometer data from N.O.A.A.orbiting satellites on 1.698 GHz and 1.707GHz to special order at a small additional cost - details on request.

When used in conjunction with the RIG synthesized V.H.F. satellite receiver this converter will give typically a signal to noise ratio of 32dB for 10 KHz deviation for a signal input to the converter of -112 dBm or 0.562 uV P.D.

FEATURES.

1). Thermally controlled crystals to ensure channel stability over a wide range of ambient temperatures.
2) D.C. powered from either direct feed to converter or via V.H.F. output provided that the host V.H.F. receiver has remote D.C. feed to aerial cable facilities.
3) Unique channel change facilities.
4) 50 ohm N type socket for input and output on module.

SPECIFICATION.

D.C. SUPPLY :- 12.0v to 14.5 v at a peak in rush current of 700 mA falling to 250 mA after approx. 10 seconds (crystal warm up).

INPUT R.F. CHANNELS:- 1.6945 GHz (METEOSAT CH 1)
1.6910 GHz (METEOSAT CH 2)
or to special order:-
1.6980GHz(N.O.A.A, A.V.H.R.R.data)
1.7070 GHz(N.O.A.A. A.V.H.R.R. data)

R.F. OUTPUT :-137.5MHz
OVERALL GAIN:- Typically 24 dB
NOISE FIGURE:- Typically 2 dB

R.F. TERMINATIONS:-50 ohm N type input and output on boxed converter.
50 ohm N type input and 50 ohm B.N.C. outputs on module.

DIMENSIONS (L x W x H) :- a). Module 181mm x 73mm x 46mm.
b). complete converter including box :-
240mm x 120mm x 100mm.

Please that these dimensions do not include connector projections.

PRICES:-

a). Assembled and tested module in tin plate box:-
£129.69 + £1.00 p&p.

b). Complete mounted in weather proof box:-
£149.56 + £2.00 p&p.
Waterproof power and channel change connector 10.00
extra if required.

How to order

Please make cheques payable to "Remote Imaging Group" and send your order to the RIG secretary. Educational establishments please note we are only able to deal with orders on a cash with order basis.

THE RIG DISH AND FEED HORN ASSEMBLY

To compliment the RIG dish when being used to receive Meteosat 2 a cylindrical horn feed and tripod feed assembly is now available from RIG. Only a limited number will be available initially and they can only be collected at the rallies the RIG are attending or by personal collection from the secretary in Leighton Buzzard. As with the dishes members must contact the secretary in order to reserve required items.

The cost is £32.50 and the unit come complete with mounting instructions for the RIG dish. All that has to be done is drill three holes in the dish and screw on the feed.

DARTCOM YU3UMV FRAME STORE A to D CONVERSION RANGE ADAPTOR.

INTRODUCTION.

Much has been written on the importance of setting the span of the A to D converter in order to utilise the full capability of the YU3UMV frame store.

These levels change not only between the various formats transmitted, (ie Infrared and visible light), but also vary between different satellites and from pass to pass, due to changing light levels.

ADAPTOR DETAILS.

This unit consists of a ready built and tested module designed to overcome these problems. The module has been made in the form of a plug in "piggy back" board which fits in place of the ADC 0804 with the minimum of disruption to the original unit.

The module will indicate the "peak black" and "peak white" levels of whatever image is being written into the memory, whilst at the same time allowing accurate setting of both these levels to obtain the best possible pictures.

The ready assembled P.C.B. is supplied with "peak" black and white adjustment pots, molex connector, indicator, cable and 20 pin I.C. holder for those of you that soldered the ADC 0804 into the P.C.B.

Price:- £17.73 inc. p&p

How to order:

Please make cheques payable to "Remote Imaging Group" and send your order to the RIG secretary. There will be a limited number of these devices available on the RIG stands at the rallies mentioned on page 2.

REQUEST FOR INFORMATION:

I need information on a Televideo TS802 computer.
Any photocopying charges will be met by me

John in Orpington
Tel. 0689 37955

Secretaries waffle continued...

AGM

The AGM has been arranged as last year, to take place at the Sandown Park Rally. This year RIG have been asked to give a talk on Weather Satellites which will be in lecture stream 'B'. The AGM will be held in the same room at the end of all the lectures and not at lunchtime as last year. If you have any topics for discussion please submit them in writing to me as soon as possible so that they can be placed on the aggenda and the committee can consider their responses.

The response to our proposal to operate a bulletin board has been very poor. Out of nearly 900 members only 12 have responded to Bob, G6KMM, (see last issue) for details of the service. The pilot is still operational any interested party should contact Bob for the information.
It is a long term hope that we can arrange with NOAA to download on a regular basis the information put up on the NOAA bulletin board in the USA. This would provide up to the minute information for RIG members.

A big thankyou to all our contributors without whom there would be no newsletter but, as ever, a plea for more contributions to the newsletter. The 'in-tray' for the next newsletter is extremely bare so please may we have some more contributions.

Hope to see you all at the AGM at Sandown in April,

Phil, G8XTW.

CONSTRUCTORS CORNER

The RIG Receiver module is proving to be very popular with members and is still available from the secretary. The full specification was printed in newsletter No. 5, but briefly the spec. is:

136 - 138 MHz Scanning receiver module
Sensitivity 0.2uV for 12 db SINAD at 10 kHz deviation
IF bandwidth 50 kHz
Audio tailoring specically designed for weather sats.

Built and aligned PCB together with
channel display module, Molex PCB connectors
and optionally, a full frequency LED readout.

Basic module with channel display £91.75

as above with LED frequency display £131.65

Price includes packing and recorded delivery.

The RIG VHF preamp also now available includes a bandpass filter and is ideal for masthead mounting. The spec. was printed in the last issue. It is available from the secretary as a built and aligned PCB measuring 85mm by 33mm (3 5/16 x 1 15/16 inches).

Module including first class post £12.50

For both the above cheques payable to "Remote Imaging Group" please

Anybody requiing PCBs should contact the secretary, G8XTW.

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NEW AND SECOND HAND SURVEILANCE EQUIPEMENT

CAMERA'S

All cameras come complete with standard 16mm lenses except low light camaras. If a wide angle lense is preferred instead of a standard there will be an extra charge of £10.00

National wv 1000	£55.00
Hitachi HV 62	£55.00
Baxall 12volt	£50.00
Baxall mains	£55.00
Sharp IT-35CZ	£50.00
RCA vidicon	£65.00
RCA ultracon **	£110.00
RCA nuvicon **	£110.00

**Low light cameras require auto iris lenses £10.00 discount if bought with camera.

MONITORS

Second hand from £45 to £60 for standard 9" 12" & 17"monitors

RING FOR AVAILABILITY

VIDEO SWITCHES

FROM £15 TO £50

LENSES

16mm S/H	£7.50
8 mm S/H	£18.00
8 mm new	P.O.A.
8 mm auto iris s/h	£35.00
16mm auto iris s/h	£35.00
25mm auto iris s/h	£45.00
Motorised zooms as availiable	P.O.A.
Camera brackets from	£5.00
Outside housing's when availiable	P.O.A.

IF ITS NOT LISTED RING

roprietors: Mr.S.P.Daniels, L.I.CERAM. Mr.J.Fraser

weather satellite kits

NEW BBC COMPUTER BASED RECEIVING STATION - Comprising interface card, and ROM or disc based software; used in conjunction with the MSR20 receiver produces a high-performance, software driven, receiving station. Some of the many features include:-

- x2, x4, or x8 'zoom' facility
- Software control of greyscales for vis./i.r
- User-defined colour palette
- North/South picture inversion facility
- Printer Dump for hard copies
- Fast picture scrole (up-down, left-right)
- WEFAX compatible with suitable demodulator
- Demo Disc available (£3, refundable)

£ 49.95 incl. VAT

SPECIAL INTRODUCTORY OFFER - Complete Weather Receiving Station package comprising:-

MSS20 BBC Computer Interface & Softaware (incl. Test Tape)
MSR20 MkII Receiver
MSR20H Receiver Hardware Kit
NEW MSA20 Aerial Kit

Special Package Price £ 126.95 incl. VAT

NEW RECEIVER HARDWARE KIT - A complete kit of hardware to finish the MSR20 receiver, including; metal case, mains transformer, fuse, fuse holder, pillars, LEDs, glands, knobs, on-off switch, etc. £ 11.95 incl. VAT

NEW MSR20 MKII RECEIVER KIT - A super-sensitive, low noise receiver. Features of the new design include built-in audio mute, electronic channel switching, and facilities for adding auto-scan, and signal strength metering modules. The receiver also has a built-in relay for automatic switching of a cassette recorder, and the PCB layout can also accommodate components for a 12v regulated PSU.

£ 54.68 incl. VAT

NEW UNIVERSAL SIGNAL STRENGTH METER - A completely new design, offering greatly improved sensitivity for comparing weak signals, with a log scale to accomodate large signals. Operates directly from any I.F between 455KHz and 18MHz. Kit comes with comprehensive instructions.

£ 8.95 incl. VAT

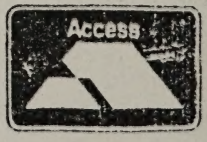
YU3UMV FRAME STORE KIT - All components for the decoder and frame store (excluding pcbs, which are obtained from Phil Seaford) offered to RIG members at the special inclusive price of £ 68.71 incl. VAT
As above, but with 256k memory ICs £ 78.37 incl. VAT

LOK SYNC. BOARD KIT - A complete set of parts to populate the LOK PCB which is available from Phil Seaford. £ 25.85 incl. VAT

MSK20 137MHz PREAMP - The ultimate in low noise preamps for low noise pictures! Will work with any receiver - for best results place at the aerial mast. Complete kit includes connectors and diecast metal box.

£ 10.95 incl. VAT

martelec



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